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| APPLICATION NO.                          | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/604,692                               | 08/11/2003  | HSIANG-LAN LUNG      | 10156-US-PA         | 1691             |
| 31561                                    | 7590        | 11/30/2004           | EXAMINER            |                  |
| JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE |             |                      | WILSON, ALLAN R     |                  |
| 7 FLOOR-1, NO. 100                       |             |                      |                     |                  |
| ROOSEVELT ROAD, SECTION 2                |             |                      | ART UNIT            | PAPER NUMBER     |
| TAIPEI, 100                              |             |                      | 2815                |                  |
| TAIWAN                                   |             |                      |                     |                  |

DATE MAILED: 11/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |           |
|------------------------------|------------------------|---------------------|-----------|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |           |
|                              | 10/604,692             | LUNG ET AL.         |           |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     | 2815      |
|                              | Allan R. Wilson        |                     | <i>DR</i> |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) Responsive to communication(s) filed on 09 November 2004.  
 2a) This action is FINAL.                            2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) Claim(s) 1-12 and 35-37 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-12 and 35-37 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_\_.

4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_.  
 5) Notice of Informal Patent Application (PTO-152)  
 6) Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 8, 9 and 35-37 are rejected under 35 USC § 102(b) as being anticipated by Yang, U.S. Patent No. 6,093,945.

With regards to claim 1, Yang illustrates in figures 3A-3F, particularly figure 3F, (entire document) a substrate 20; a charge-trapping layer 13 on the substrate; a split gate 14, 19 on the charge-trapping layer, including at least one split region directly over the charge-trapping layer; and a source/drain 23/24 in the substrate beside the split gate.

With regards to claim 1, the limitation “the charge-trapping layer around the split region serves as a coding region” is an inherent function of the structure and since the prior art has the same structure and materials as the claimed invention it will have the same inherent function.

With regards to claim 2, Yang illustrates in figs. 3D-3F the split gate consists of at least two pieces 14 and 19 separated by a dielectric layer 16 and the split gate consists of three pieces.

With regards to claim 3, Yang illustrates in figs. 3D-3F the split gate consists of three pieces 14, 19 and 14.

With regards to claim 4, Yang illustrates in figs. 3D-3F the three pieces of the split gate include a pair of conductive spacers 14 and a conductive layer 19 between the pair of conductive spacers.

With regards to claim 5, Yang illustrates in fig. 3F the pair of conductive spacers 14 are arranged with two substantially vertical sidewalls thereof adjacent to the source/drain 23/24.

With regards to claim 6, Yang illustrates in figs. 3C-3F an insulator 11 on the source/drain, wherein the pair of conductive spacers 14 are disposed on the sidewalls of the insulator.

With regards to claim 8, Yang discloses in col. 4, lines 11-14, the dielectric layer 16 comprises silicon oxide.

With regards to claim 9, Yang discloses in col. 8, lines 1-21, the split gate 14 and 19 comprises polysilicon.

With regards to claims 35-37, the claimed “programming operation” is not considered to add any structure to the claimed device and is considered to be intended use of the device. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

Claims 1, 7, 10 and 12 are rejected under 35 USC § 102(b) as being anticipated by Liang et al. (“Liang”), U.S. Patent No. 5,714,412.

With regards to claim 1, Liang illustrates in figures 1-9C, particularly figure 7, (entire document) a substrate 12; a charge-trapping layer 19 on the substrate; a split gate 18’, 18”, 20 on

(including “on” the side) the charge-trapping layer, including at least one split region 20 directly over the charge-trapping layer; and a source/drain 14’/14” in the substrate beside the split gate.

With regards to claim 7, Liang illustrates in fig. 9C different pieces of the split gate are electrically connected to each other.

With regards to claim 10, Liang discloses in col. 4, lines 41-67, the charge-trapping layer 19 comprises a silicon nitride layer disposed between two silicon oxide layers ONO.

With regards to claim 12, Liang illustrates in fig. 7 the substrate comprises a p-substrate 12, and the source/drain comprises an n-type source/drain 14.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 11 is rejected under 35 USC § 103 (a) as being unpatentable over Yang as applied to claim 1 above, and further in view of Schwabe et al. (“Schwabe”) U.S. Patent No. 4,257,832.

With regards to claim 11, Yang is discussed above, it does not show the charge-trapping layer comprises aluminum oxide ( $Al_2O_3$ ). Schwabe discloses in col. 3, lines 11-15 a charge-trapping layer comprises aluminum oxide ( $Al_2O_3$ ). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have  $Al_2O_3$  to function as a tunnel oxide.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Yeh (illustrates split-gate non-volatile memory cell) and Chen et al. (illustrates a triple-polysilicon split gate).

| Field of Search  | Date              |
|--|-------------------|
| U.S. Class and subclass:<br>257/314-316  | November 22, 2004 |
| Other Documentation:<br>None   | N/A               |
| Electronic data base(s):<br>EAST (USPAT, US-PGPUB, JPO, EPO, Derwent, IBM TDB) | November 22, 2004 |

Any inquiry concerning this communication or earlier communications from an examiner should be directed to Primary Examiner Allan Wilson whose telephone number is (571) 272-1738. Examiner Wilson can normally be reached 7:00-4:00 Monday-Thursday and 6:00-3:00 on Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allan R. Wilson  
Primary Examiner  
22 November 2004